1. A system for measuring tape pack radii, comprising:

a tape supply reel, said tape supply reel rotating as a tape leaves said tape supply reel during a tape transfer process;

a tape take-up reel for receiving tape from said tape supply reel, said tape take-up reel rotating to receive said tape during said tape transfer process;

a first angular position transducer to measure an angular position of said tape supply reel;

a second angular position transducer to measure an angular position of said tape take-up reel;

a third angular position transducer to measure an angular position of a mechanical device, said mechanical device changing said angular position as said tape leaves said tape supply reel and is received by said tape take-up reel;

a processor having a Kalman filter, said Kalman filter responsive to one or both of an angular position measurement by said first angular position transducer and an angular position measurement by said second angular position transducer and also responsive to an angular position measurement by said third angular position transducer, to calculate an updated estimate of one or both of a supply radius of a tape pack on said tape supply reel and a take-up radius of a tape pack on said tape take-up reel;

a servo-controller, responsive to one or both of said supply radius and said take-up radius, to control rotation of said tape supply reel and said tape take-up reel.

12. A method for estimating a length of tape on at least one reel, comprising:

measuring a first angular position of a tape supply reel of said at least one reel;

measuring a second angular position of a tape take-up reel of said at least one reel;

measuring a third angular position in response to movement of said tape; and,

estimating by a processor employing a Kalman filter said length of tape on said at least one reel, in response to said first angular position of said tape supply reel, said second angular position of said tape take-up reel, and said third angular position in response to movement of said tape.

15. (Amended) A method for estimating a length of tape on one or more reels, comprising:

measuring a first angular position of a tape supply reel of said one or more reels;

measuring a second angular position of a tape take-up reel of said one or more reels;

measuring a third angular position of a capstan engaging the tape;

measuring a fourth angular position of a tape tension arm;

selecting either said tape supply reel or said take-up reel as a selected reel; and,

estimating said length of tape by a processor employing a Kalman filter, said Kalman filter responsive to said angular position of said selected reel, said third angular position of said capstan, and said fourth angular position of said tape tension arm.

17. A method for estimating the amount of tape on a tape reel, comprising:

measuring a first angular position of said tape reel;

measuring a second angular position of a cylindrical member engaging and rotating with the tape as the tape moves along a tape path;

measuring a third angular position of a tension arm engaging the tape between said reel and said cylindrical member; and,

estimating how much tape is on said tape reel by a processor employing a Kalman filter, said Kalman filter responsive to said first angular position of said tape reel, said second angular position of said cylindrical member, and said third angular position of said tension arm.

20. A system for measuring how much tape is on a reel from and to which tape is unwound and wound respectively during the rotation of the reel as the tape is moved along a tape path, comprising:

a cylindrical member engaging the tape at a position along the tape path that establishes a tape path length from the reel, said cylindrical member engaging said tape, said cylindrical member rotating as the tape is moved along the tape path;

a first angular position transducer for measuring a first angular position of said reel as the tape is moved along the tape path;

a second angular position transducer for measuring a second angular position of the cylindrical member as the tape is moved along the tape path; and

a processor including a Kalman filter responsive to the first and second angular positions measured by the first and second angular position transducers for calculating how much tape is on said reel.

34. A method for estimating a length of tape on a reel, comprising:

a. choosing a variable to be measured, said variable related to estimating a length of tape on a reel;

b. selecting a minimum and maximum acceptable measurement value of said variable;

c. selecting a maximum acceptable variance of said variable;

d. recording an individual measurement of said variable;

e. determining if said individual measurement's variance is greater than said maximum acceptable variance;

f. determining if a three sigma-interval around said individual measurement is not at least partially included within an interval from said minimum to said maximum acceptable measurement values;

if the determinations in steps e OR f prove true, ignoring the individual measurement and basing the current Kalman filter estimate on other measurements and on previous Kalman filter estimates.